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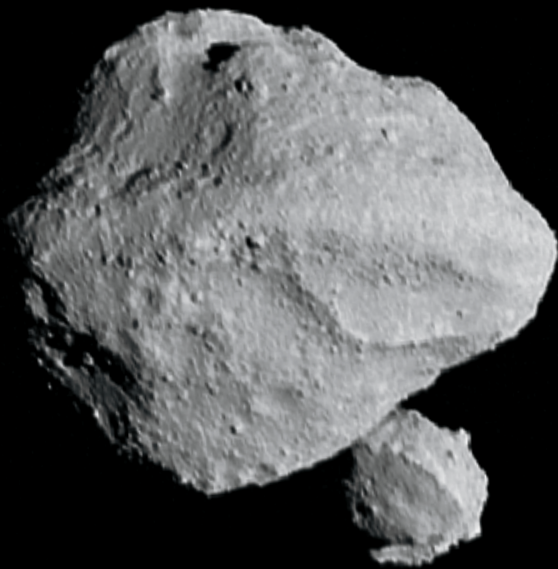
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NASA'S LUCY DISCOVERS SURPRISE ASTEROID ON 'DINKY' FLYBY

The craft zipped past Dinkinesh as a test run, but wound up discovering a new object.

THIS IS GETTING OUT OF HAND ... During its flyby Nov. 1, Lucy discovered that its target, Dinkinesh, is not one, but two asteroids. Here, the smaller companion appears from behind the larger Dinkinesh. NASA/GODDARD/SWRI/JOHNS HOPKINS APL/NOIRLAB

Since its launch two years ago, NASA's Lucy mission has been traveling the inner solar system on its way to explore Jupiter's Trojan asteroids. Lucy is a flyby-only mission, meaning it won't stop to orbit any of its targets. Instead, it will take as much data as possible as it approaches, passes, and pulls away from each asteroid on its list.

But thanks to Lucy's Terminal Tracking System (TTS) — a pair of cameras that image its targets as Lucy approaches — the craft will get up-to-the-minute position information that allows the instruments to autonomously determine when it will be best to collect valuable data.

On Nov. 1, 2023, Lucy zipped past 152830 Dinkinesh, a tiny main-belt asteroid less than half a mile (0.8 kilometer) wide. The flyby, intended to test the TTS, saw Lucy pass within just 300 miles (480 km) of Dinkinesh, and revealed not one, but two asteroids: the larger Dinkinesh and a smaller, 0.15-mile-wide (220 meters) companion. That brings Lucy's total number of targets up to 11; the mission was launched intending to visit nine asteroids, with Dinkinesh only added earlier this year.

And if that bonus wasn't enough, more detailed images delivered a few days later found that Dinkinesh's satellite is actually two bodies in permanent contact with one another, known as a contact binary. Initial images of the Dinkinesh system, which first saw the moon, did not catch the contact binary because one lobe sat directly behind the other from that point of view. Although such two-lobed asteroids are common in the solar system, researchers have had few opportunities to study them up close. This is the first known contact binary that is a satellite of another asteroid.

Lucy's next objective involves heading toward Earth for a gravity assist in December this year. The craft will then take images of another main-belt asteroid, 52246 DonaldJohanson, which is five times the size of Dinkinesh, on April 20, 2025. Lucy will begin its primary mission to study Jupiter's Trojan asteroids in 2027. — ALISON KLESMAN, SAMANTHA HILL
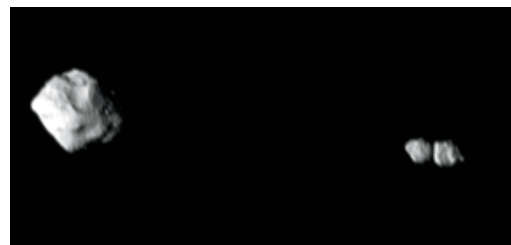
... NOW THERE ARE TWO OF THEM! Six minutes after Lucy's closest approach to Dinkinesh, the craft snapped this image, revealing that the satellite is a contact binary. NASA/GODDARD/SWRI/JOHNS HOPKINS APL

Cosmological simulation milestone

THE DYNAMICAL DANCE of physics can entrance — especially when modeled in vast supercomputer simulations of the cosmos. A new project dubbed FLAMINGO is one of the most detailed simulations to date, taking place in a virtual volume of space over 9 billion light-years on a side filled with 300 billion particles, each the size of a small galaxy.

But what makes FLAMINGO truly stand out is that it incorporates the effects of both dark matter and normal matter. Such simulations often focus on dark matter, the invisible stuff that scientists think makes up around 85 percent of the matter in the universe. This is convenient, because according to theory, dark matter barely interacts (or collides) with normal matter, meaning it can be modeled purely through gravity.

But normal (or baryonic) matter — despite only making up 15 percent of the matter in the universe — can't be ignored. For instance, the supermassive black holes at the centers of galaxies feed on normal matter, which generates magnetic fields that fire matter back out into the void. These winds collide